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Rule Consistency Demonstration: El Paso Exceptional Event

This table establishes the rule consistency of Texas Commission on Environmental Quality's ("TCEQ") ozone exceptional events demonstration for the El Paso UTEP monitor for June 21, 2015 (the "El Paso Demonstration").[1]

The El Paso Demonstration meets each criterion of both EPA's 2007 Exceptional Events Rule, and the rule revisions that EPA published on October 3, 2016.[2] Further, as outlined in Exhibit A, the El Paso Demonstration also satisfies the data elements in EPA's 2016 guidance for wildfire exceptional event demonstrations.[3]

	Demonstration Element - 2007 Exceptional Events Rule	**Demonstration Element - 2016 Revised Rule**[4]	**Standard for Meeting the Element**	**How the Element is Met by the El Paso Demonstration**
1	The event affects air quality, 40 C.F.R. § 50.1(j).	Narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s), new 40 C.F.R. § 50.14(c)(3)(iv)(A).	An event satisfies this element if it meets the "clear causal relationship" and "historical fluctuations" elements.[5]	As discussed below, the demonstration elements for "clear causal relationship" and "historical fluctuations" are satisfied. A narrative conceptual model is provided in Chapter 1 of the TCEQ's demonstration, which describes a conceptual model for ozone in El Paso, identifies the key fires that contributed to the ozone exceedance at the UTEP monitor, and provides an explanation of how the fire emissions contributed to the measured ozone level. Wildfires are a significant part of the appropriate conceptual model for the highest-ozone days observed in El Paso.

[1] Letter, Richard A. Hyde to Mr. Ron Curry, September 27, 2016.
[2] 80 Fed. Reg. 68,216, Treatment of Data Influenced by Exceptional Events.
[3] 80 Fed. Reg. at 68,216; EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (Final Sept. 2016), at 24 -30, available at https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_guidance_9-16-16_final.pdf (last accessed May 18, 2017)
[4] https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_rule_revisions_2060-as02_final.pdf (last accessed September 19, 2016); 80 Fed. Reg. 72,839 (Nov. 20, 2015).
[5] 72 Fed. Reg. 13,560, 13,569 (Mar. 22, 2007); Memorandum from Stephen D. Page, EPA, to Regional Air Directors, Regions I-X, Subject: Interim Guidance to Implement Requirements for the Treatment of Air Quality Monitoring Data Influenced by Exceptional Events (May 10, 2013) at 4 (available at https://www.epa.gov/sites/production/files/2015-05/documents/exceptevents_guidememo_130510.pdf, last accessed September 15, 2016).

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	Demonstration Element - 2007 Exceptional Events Rule	Demonstration Element - 2016 Revised Rule[4]	Standard for Meeting the Element	How the Element is Met by the El Paso Demonstration
2	The event is not reasonably controllable or preventable, 40 C.F.R. § 50.1(j).	The event is not reasonably controllable or preventable, new 40 C.F.R. § 50.14(c)(3)(iv)(D).	This demonstration element is met for wildfires generally and for fires located outside of the state submitting the Exceptional Events demonstration.[6]	The relevant fires were wildfires and were outside of Texas and therefore could not be regulated by the TCEQ.[7]
3	The event is an event caused by human activity that is unlikely to recur at a particular location or a natural event, 40 C.F.R. § 50.1(j).	The event was a human activity that is unlikely to recur at a particular location or was a natural event, new 40 C.F.R. § 50.14(c)(3)(iv)(E).	Wildfires presumptively qualify as natural events, and even if influenced by human activity meet this criterion if they are unlikely to recur at that particular location.[8]	The primary wildfire in question was caused by a lighting strike, which is a natural cause. For the small-acreage contributing fires that were caused by human activity, the burning out of those areas significantly reduces the likelihood of another fire in that particular location.[9]

[6] 80 Fed. Reg. at 72,843; EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (Final Sept. 2016), at 32, available at https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_guidance_9-16-16_final.pdf (last accessed Sept. 19, 2016); Memorandum from Stephen D. Page, EPA, to Regional Air Directors, Regions I-X, Subject: Interim Guidance to Implement Requirements for the Treatment of Air Quality Monitoring Data Influenced by Exceptional Events (May 10, 2013) at 5; EPA, *Draft Guidance to Implement Requirements for the Treatment of Air Quality Monitoring Data Influenced by Exceptional Events* (June 2012) at 4.
[7] TCEQ Demonstration section 2.6, page 2-4; sections 3.4-3.5, page 3-3.
[8] 80 Fed. Reg. at 72,850; 72 Fed. Reg. at 13,566.
[9] TCEQ Demonstration section 2.7, pages 2-4--2-5.

	Demonstration Element - 2007 Exceptional Events Rule	Demonstration Element - 2016 Revised Rule[4]	Standard for Meeting the Element	How the Element is Met by the El Paso Demonstration
4	There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected air quality in the area, 40 C.F.R. § 50.14(c)(3)(iv)(B).	The event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation, new 40 C.F.R. § 50.14(c)(3)(iv)(B).	An exceptional event meets the common features of the "clear causal relationship" and "but for" elements if the demonstration includes the following: • Evidence of biomass burning, acreage, and air trajectories linking the burnt areas to the high-ozone air quality monitors.[10] • "Altered pollutant amounts, ratios, or patterns that indicate the influence of the event rather than non-event sources. This information could include the level, timing and patterns of CO and PM..."[11] • "Evidence that the plume from the fire passed over the location of the monitoring site and mixed down to ground level. This can include...visual smoke observations..."[12] Additional principles are outlined in EPA's 2016 wildfire guidance. See Exhibit A: "Clear Causal Relationship Technical Demonstration Components Recommended for Tier 2 and Tier 3 Demonstrations" for more detailed list of criteria for meeting this demonstration element, in alignment with EPA 2016 guidance.	The El Paso Demonstration satisfies this element as follows: • There is evidence of wildfires with defined acreage, and air trajectories link those fires to the UTEP monitor on June 21, 2015.[13] • There is an unusual correlation between $PM_{2.5}$ emissions and ozone on June 21, 2015, indicative of biomass combustion products. • There are satellite measurements of elevated CO and aerosol optical depth data on June 21, 2015, also indicative of biomass combustion. • Images from TCEQ-operated webcams located at El Paso air quality monitors show the presence of substantial visibility-impairing haze on June 21, 2015, which further indicates the connection between wildfires and the ozone exceedance at the UTEP monitor.[14] • CAMx photochemical modeling shows a clear causal connection between regional fire emissions and ozone at CAMS12 on June 21, 2015.[15] • Statistical regression analysis shows that observed ozone values on June 21, 2015, cannot be explained by normal meteorological processes or routine emissions.[16] See Exhibit A: "Clear Causal Relationship Technical Demonstration Components Recommended for Tier 2 and Tier 3 Demonstrations" for more detailed list of information provided to address data recommendations of EPA 2016 guidance.

[10] Letter from Karl Brooks, EPA Region 7, to John Mitchell, Kansas Department of Health and Environment, Re: Exceptional event requests regarding exceedances of the 8-hour ozone NAAQS at multiple monitors in Kansas during April of 2011 (Dec. 28, 2012), available at http://www.kdheks.gov/bar/air-monitor/exceptevent/Flint_Hills_Letter_12-28-12.pdf (last accessed September 15, 2016); Kansas Department of Health and Environment, *State of Kansas Exceptional Event Demonstration Package: April 6, 12, 13, and 29, 2011* (Nov. 27, 2012) at Chapter 4 (available at https://www.epa.gov/sites/production/files/2015-05/documents/kdhe_exevents_final_042011.pdf, last accessed September 15, 2016).

[13] TCEQ Demonstration section 3.2, pages 3-1--3-3, section 3.7, pages 3-5--3-9.

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	Demonstration Element - 2007 Exceptional Events Rule	Demonstration Element - 2016 Revised Rule[4]	Standard for Meeting the Element	How the Element is Met by the El Paso Demonstration
5	There would have been no exceedance or violation but for the event, 40 C.F.R. § 50.14(c)(3)(iv)(D).	Not applicable.	In addition to the common features of the "clear causal relationship" and "but for" elements as discussed above under the "clear causal relationship" element, an event meets the "but for" test if it: • Relies on "analysis of ozone concentrations on days with similar meteorological conditions but without smoke impacts"[17] to demonstrate that the exceedances would not have occurred but for the fires in question.[18] • Provides "Statistical evidence that shows that for the place, time of year, and prevailing weather conditions at the time of the event, past ozone data show no history of exceedances on days that were not affected by a fire event, or shows that exceedances were so infrequent as to make the fire at issue the more likely cause of the observed exceedance."[19]	The Demonstration meets the "but for" test as follows: • The El Paso Demonstration includes analysis of a day with similar meteorological conditions but without wildfire impacts, during which the UTEP monitor was below the ozone standard.[20] • From 2009-2015, there was no other ozone exceedance at the UTEP monitor on a Sunday in June or July besides June 21, 2015. The second-highest UTEP Sunday ozone measurement during June 2009-2015 was 70 ppb. • Biomass burning generally has been found to cause 24-100% increases in surface ozone concentrations,[21] an increase more than sufficient to cause the June 21, 2015 ozone exceedance. • The common features of the "but for" and "clear causal relationship" elements are met, as noted above. • The statistical regression analysis shows that the wildfire's minimum contribution to the maximum daily 8-hour ozone was 7ppb.

[12] *Id.*
[13] TCEQ Demonstration section 3.2, pages 3-1--3-3, section 3.7, pages 3-5--3-9.
[14] Archived images from the monitor webcams are available on request from TCEQ staff.
[15] Memorandum, *CAMx Modeling of June 21, 2015*, Sue Kemball-Cook and Jeremiah Johnson to Marise Textor and Jessica Christianson, February 14, 2017.
[16] *Wildfire Impacts on Ozone on June 21, 2015 at the El Paso UTEP Monitoring Site*, Dr. Dan Jaffe, May 17, 2017.
[17] Letter from Karl Brooks, EPA Region 7, to John Mitchell, Kansas Department of Health and Environment, Re: Exceptional event requests regarding exceedances of the 8-hour ozone NAAQS at multiple monitors in Kansas during April of 2011 (Dec. 28, 2012); Kansas Department of Health and Environment, *State of Kansas Exceptional Event Demonstration Package: April 6, 12, 13, and 29, 2011* (Nov. 27, 2012) at 1-8.
[18] The Kansas demonstration included photochemical modeling for some, but not all of the days excluded. For April 29, 2011, an EPA-approved day in which out of state fires were involved, the Kansas demonstration observed that photochemical modeling could not replicate the effects of Texas fires on Kansas ozone but was not a necessary component of the demonstration. *Id.* at 6-32.
[19] EPA, *Interim Exceptional Events Rule Frequently Asked Questions* (May 2013) at 10-11 (available at https://www.epa.gov/sites/production/files/2015-09/documents/eer_qa_doc_5-10-13_r3.pdf, last accessed Sept. 16, 2016).
[20] TCEQ Demonstration section 2.12, page 2-7, section 3.8, pages 3-9–3-12.
[21] "Globally, ozone precursors (e.g. VOCs and NOx) emitted by vegetation fires are responsible for about 10% enhancement of tropospheric ozone levels. Regionally, however, biomass burning can temporally increase background surface ozone concentrations by 24% to well over 100% causing exceedence of regulatory standards. Ozone formed in smoke plumes along with its precursors and aerosol particles emitted from large fires

	Demonstration Element - 2007 Exceptional Events Rule	Demonstration Element - 2016 Revised Rule[4]	Standard for Meeting the Element	How the Element is Met by the El Paso Demonstration
6	The event is associated with a measured concentration in excess of normal historical fluctuations, including background, 40 C.F.R. § 50.14(c)(3)(iv)(C).	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times, new 40 C.F.R. § 50.14(c)(3)(iv)(C).	An event meeting any of the following tests exceeds normal historical fluctuations: • The event exceeds the 95th percentile of historical values during the relevant season.[22] • The ozone measurement was the second-highest ozone level recorded at the particular monitor during that calendar year (as indicated by a recent demonstration co-authored by EPA Region 8).[23] • The event affects fewer than 135 exceedances on 25 days (as indicated by a recent court decision upholding an EPA action that concurred with 135 exceptional events claims affecting 25 days in the Phoenix, Arizona area).[24]	The El Paso Demonstration meets all three formulations: • The June 21, 2015, ozone levels at the UTEP monitor were above the 99th percentile of data from 2009-2015. • The June 21, 2015 UTEP ozone level was the second-highest recorded ozone level in El Paso during 2015. • For purposes of the TCEQ's demonstration, the event is policy-relevant by affecting a single ozone exceedance at a single monitor.[25] June 21, 2015 was selected on the basis of its policy relevance, although there are other ozone exceedances in the El Paso area since 2009 that coincided with nearby wildfire activity and would potentially meet the definition of exceptional events.

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can be transported by weather systems over large distances spanning continental scales. When brought down toward the surface via smoke plume entrainment into the planetary boundary layer, fire-generated VOCs and NOx can cause severe ozone episodes over metropolitan areas that are hundreds and even thousands of miles away from the fire locations." Ned Nikolov, *Impact of Wildland Fires and Prescribed Burns on Ground Level Ozone Concentration: Review of Current Science Concepts and Analytical Approaches* (prepared for U.S. Forest Service), available at https://www.nifc.gov/smoke/documents/Impact_Wildland_fire_on_Ozone.pdf, last accessed Sept. 16, 2016).

[22] 72 Fed. Reg. 13,560, 13,569 (Mar. 22, 2007) ("In addition, the magnitude of the measured concentration on days affected by exceptional events relative to historical, temporally adjusted air quality levels can guide the level of necessary analysis and documentation to demonstrate that the event affected air quality. **For extremely high concentrations relative to historical values (e.g., concentrations greater than the 95th percentile), a lesser amount of documentation or evidence may be required to demonstrate that the event affected air quality.** The closer the event concentration is to typical levels (e.g., values less than the historical 75th percentile), the stronger the necessary evidence would have to be to justify exclusion of data for regulatory purposes. This weight of evidence approach is most nearly analogous to our historical treatment of exceptional events.") *see also* EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (Final Sept. 2016), Figures 2 and 3.

[23] Ute Indian Tribe of the Uinta and Ouray Reservation, U.S. EPA Region 8, Utah State University Bingham Energy Center, and Utah Division of Air Quality, *Technical Support Documentation: Ozone NAAQS Exceedances Occurring June 8 and 9, 2015, Uinta Basin of Utah* (Aug. 30, 2016) at 3 (available at https://www.epa.gov/sites/production/files/2016-08/documents/tsd_strato3_june_2015_ute_tribe_public_comment.pdf, last accessed September 15, 2016).

[24] *Bahr v. EPA*, No. 14-72327, 2016 WL 4728040 (9th Cir. Sept. 12, 2016).

[25] TCEQ Demonstration section 2.11, page 2-7, section 3.1, page 3-1, section 3.6, page 3-3.

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Exhibit A. El Paso Exceptional Event Demonstration: Clear Causal Relationship Technical Demonstration Components Recommended for Tier 2 and Tier 3 Demonstrations[1]

Tier 2 Analyses Should Include	What the El Paso Demonstration Includes
Comparison of the fire-influenced exceedance with historical concentrations	6/21/2015 UTEP MDA8 was above the 99th percentile for 2011-2015.
Evidence that the fire and monitor(s) meet the key factors (#1 and #2)	• Key Factor #1 is not met (Q/D < 100). However, this method appears to be inconsistent with peer reviewed scientific analyses demonstrating that for most wildfire plumes, ozone concentrations increase with distance from the fire.[2] • Key Factor #2 is met (MDA8 is in the 99th or higher percentile over 5 years).
Evidence of transport of fire emissions from the fire to the monitor (**one** of these): • Trajectories linking fire with the monitor (forward and backward), considering height of trajectories • Satellite evidence in combination with surface measurements	1) Near surface level backward and forward trajectories run with alternate gridded meteorological datasets (NARR, EDAS, NAM, WRFCAMx) consistently link the UTEP monitor with the Hog Fire. 2) Elevated trajectories run with alternate meteorological datasets consistently link the UTEP monitor with the Whitetail Fire (elevated trajectories). 3) Satellite remote sensing data indicates small but significant elevations in aerosol absorption optical depth and CO over El Paso on 6/21/201. These observations are consistent with small but significant elevations in CO and $PM_{2.5}$ at surface level TCEQ CAMS.
Evidence that the fire emissions affected the monitor (**one** of these): • Visibility impacts (satellite or photo) • Changes in supporting ground level measurements • Satellite NOx enhancements • Differences in spatial/temporal patterns	1) $PM_{2.5}$ 1-hour averages peak at 12:00 noon and correlate very well with ozone. Midday peak in $PM_{2.5}$ is very rare except on days when levels are elevated due to smoke or wind-blown dust. Correlation with ozone suggests a clear causal relationship.[3] 2) CAMx model shows a clear causal relationship between fire emissions and ozone. 3) Sequential photographs of scenic targets show reduced visibility at time of peak ozone.
Additional Analyses to Support a Tier 3 Analysis	
A Tier 3 analysis may include one or more of the following: • Matching day analysis • Statistical regression analysis • Photochemical modeling	1) Ozone levels on days with matching weather conditions but no apparent fire impacts did not exceed 70 ppb. 2) Photochemical modeling shows a clear causal relationship between the wildfire emissions and the ozone levels in El Paso. 3) Statistical regression analysis shows that variances in weather and other parameters that tend to drive day-to-day variations in peak ozone do not account for all the ozone measured on 6/21/2015. A residual of 23 ppb is most likely attributed to wildfires.

[1] 80 Fed. Reg. at 68,216; EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (Final Sept. 2016), at 24 -30, available at https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_guidance_9-16-16_final.pdf (last accessed May 18, 2017), Table 2 at page 24 and Section 3.6 at page 25.

[2] Jaffe, D.A., Wigder, N.L. (2012). Ozone production from wildfires: A critical review. Atmos. Environ. 51, 1-10, 10.1016/j.atmosenv.2011.11.063.

[3] *Wildfire Impacts on Ozone on June 21, 2015 at the El Paso UTEP Monitoring Site*, Dr, Dan Jaffe, May 17, 2017 at 7, states that of the 30 days over 2010-2015 with an MDA8 greater than 70 ppb, "June 21, 2015 is the only day with a statistically significant positive correlation between PM and O_3", further confirming the importance of smoke on June 21, 2015.